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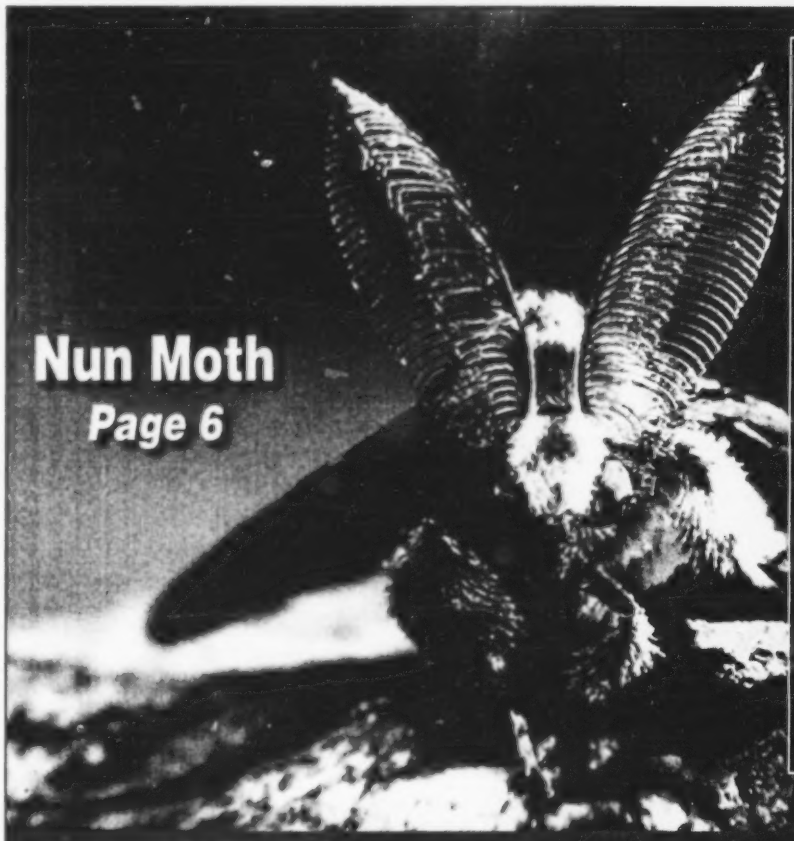

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XII^e Congrès forestier mondial
XII World Forestry Congress
XII Congreso Forestal Mundial

QUÉBEC CANADA 2003
September 21 to 28
www.wfc2003.org

World Forestry Congress 2003
(see story on page 10)

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2007-03434/

Researchers Find Mechanism of Resistance to Armillaria Root Disease In Douglas-fir And Western Larch

"We know what we're looking for now. This means we can select families of Douglas-fir and see how they respond to the fungus."

Interior Douglas-fir is an economically important tree species, widely planted, and one of the most susceptible species to infection and killing by Armillaria. Research by Dr. Richard Robinson and Dr. Duncan Morrison (dmorrison@pfc.cfs.nrcan.gc.ca) identified some of the mechanisms of resistance to infection by *Armillaria ostoyae* in western larch and Douglas-fir, making it possible for researchers to inoculate selected Douglas-fir and, gauging from the trees' responses, identify individuals which show resistance to the root disease.

This research was a part of Morrison's research agenda at the Canadian Forest Service Pacific Forestry Centre in Victoria, through which Morrison provides forestry practitioners in government, industry and the consulting community with tools to decrease damage caused by root diseases in forests. It was also a component of Robinson's PhD research, funded by the Canada/British Columbia Forest Resources Development Agreement (FRDA), entitled "Response of western larch and Douglas-fir to infection by *A. ostoyae*." Before Robinson and Morrison's research, no previous study compared the response of different-aged trees to infection by Armillaria root disease had been published, nor had any work been done comparing these two species.

Armillaria ostoyae, a fungus, causes Armillaria root disease in coniferous trees. Armillaria occurs throughout the southern third of the interior of BC, and can infect and kill all tree species in the area. The fungus attacks the roots of the tree, causing decay and spreading inward to the stem, which it girdles, and kills the tree by stopping the uptake of water and nutrients. The fungus can kill up to 2% of Douglas-fir seedlings in plantations each year until trees are mature enough to respond effectively.

Robinson and Morrison studied the roots of diseased and healthy western larch and Douglas-fir trees of different ages. They hoped to determine whether there was a difference in response to the fungus depending on the age of the tree, and whether there was a difference in resistance mechanisms between the two tree species at the same age.

They found that host response did depend on the age of the tree, with most trees of both species not surviving infection below about 15 years of age. They also found that both species

Don Norris, retired pathologist from Nelson Fort Region, stands beside a six-year-old western larch.

responded in the same manner to infection by *A. ostoyae*: the most resistant hosts formed a type of tissue called necrophylactic periderms around the site of an infection, thereby preventing it from spreading toward the stem.

A necrophylactic periderm is a tissue response to a wound caused by a fungus or other factor. The ability of necrophylactic periderms to quickly create multiple layers of phellem is age dependent, and is the determining factor in tree resistance to *A. ostoyae*. The only differences between the two species were that western larch has the ability to form bands of necrophylactic periderms at a younger age than does Douglas-fir, and western larch grows faster, an added advantage in avoiding the disease. This finding actually surprised the researchers, who thought, based on their experiences in the field, there would be more difference between Douglas-fir and larch.

Robinson and Morrison's research confirmed that western larch shows resistance to *A. ostoyae* at a younger age and with greater frequency than Douglas-fir, and revealed the mechanism of that resistance. "We know what we're looking for now," says Morrison. "This means we can select families of Douglas-fir and see how they respond to the fungus. Geneticists could then provide seed from the most resistant families from the population to the forest industry to regenerate forests that are healthy and well-stocked."

Softwood lumber industry funding package targets BC's mountain pine beetle epidemic

"The BC Ministry of Forests has worked hard to meet its responsibilities on Provincial Crown land. The goal of Natural Resources Canada will be to address areas of federal jurisdiction."

The Government of Canada announced in early October a $246.5 million funding package to support softwood lumber workers and communities. Among a range of measures included is a 5-year, $40-million program to address the mountain pine beetle epidemic in British Columbia. Natural Resources Canada Minister Herb Dhaliwal, Industry Minister Allan Rock, Human Resources Development Minister Jane Stewart, and International Trade Minister Pierre Pettigrew developed the mountain pine beetle initiative as a partnership among departments of the federal government, the BC Government, national research institutes, First Nations, and industry.

Canadian Forest Service staff and researchers at the Pacific Forestry Centre in Victoria will play a lead role in the mountain pine beetle initiative, which is designed to complement provincial government efforts in response to the mountain pine beetle epidemic. "The BC Ministry of Forests has worked hard to meet its responsibilities on Provincial Crown land. The goal of Natural Resources Canada will be to address areas of federal jurisdiction," explains Dr. Paul Addison, Director General at the Canadian Forest Service research facilities in Victoria.

The mountain pine beetle initiative is divided between rehabilitation of federal and private (non-industrial) forest lands ravaged by the mountain pine beetle, and conducting research to quantify the impacts and reduce the risk of future mountain pine beetle epidemics. The 5-year research agenda is designed to answer forest land management questions. In the short term, dealing with the current epidemic and getting the best value from affected forests is critical. Looking ahead, research is needed on quantifying the economic and ecological impacts of beetle infestations, and on developing options to reduce the risk of future epidemics.

The Federal Lands Program will address mountain pine beetle impacts in national parks, First Nations reserve lands and the Chilcotin Military Reserve lands in cooperation with Parks Canada, Indian and Northern Affairs Canada and the Department of National Defence. The focus will be on containment of the infestation in parks, on control, rehabilitation and forest management capacity in First Nations reserves, and on forest rehabilitation on military lands. The Private Forest lands Program will target private, non-industrial landowners. These landowners will be encouraged to participate in efforts to deal with the beetle through early identification and intervention as well as the clean up of those forest stands already infected.

Endemic in lodgepole pine stands throughout western North America, the mountain pine beetle is normally limited to highly stressed trees within the pine forest ecosystem. However when the right circumstances align, such as large areas of mature pine, fire suppression, and several years of warm winters, outbreaks make it the most destructive insect pest of mature pine forests.

The mountain pine beetle infestation in the west-central interior of BC, present for approximately 10 years, has increased rapidly in recent years. At over 1.46 million hectares of infested trees, the infestation is the largest in BC's history. Dr. Bill Wilson (**bwilson@pfc.cfs.nrcan.gc.ca**), Director of the Industry, Trade and Economics Research Program at the Pacific Forestry Centre, will lead the mountain pine beetle initiative for the Canadian Forest Service. Wilson estimates the potential impact of the mountain pine beetle infestation at $4.03 billion in lost lumber alone, or 34% of the total value of Canadian softwood production in 2000/01.

As this management plan unfolds, scientists, stakeholders, industry representatives and members of the general public have the opportunity to collaborate with the Mountain Pine Beetle Initiative, share expertise, and contribute to managing beetle-related problems. Look for program updates in subsequent issues of Information Forestry.

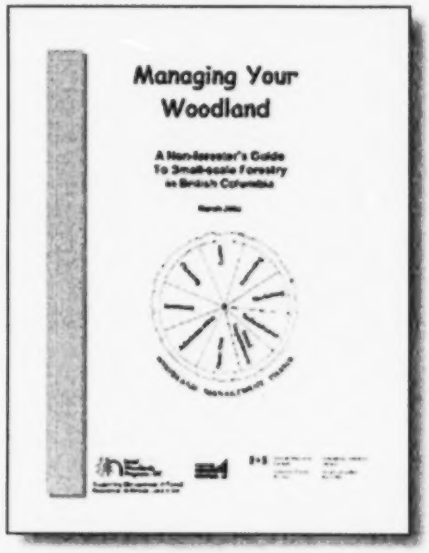
For more information on the mountain pine beetle epidemic and research at the Pacific Forestry Centre see our website at **www.pfc.cfs.nrcan.gc.ca/entomology/mpb/index_e.html**. For breaking news see the Natural Resources Canada website at **www.nrcan.gc.ca/inter/index_e.html** or the Ministerial news release at **www.nrcan.gc.ca/media/newsreleases/2002/2002117_e.htm**. The response of the BC provincial government to the mountain pine beetle epidemic is at **www.for.gov.bc.ca/PAB/News/Features/beetles/index.htm**.

Updated Version of "Managing Your Woodland" Handbook Available Online

"The original handbook provided good basic information on a variety of technical forestry areas."

There are an estimated 20 thousand people in British Columbia with enough land to practice small-scale, sustainable forestry. These include people with residential land holdings, farmland, agricultural leases and First Nations reserves. For these people and anybody else who wants to expand their skills and knowledge, the Canadian Forest Service and the Forest Renewal British Columbia Small Woodlands Program developed an online third edition of the handbook *Managing Your Woodland: A non-forester's guide to small-scale forestry in BC.* This is a forestry guide for non-foresters, a do-it-yourself handbook of how to meet goals, have fun and make money managing a woodland. And it's free.

One of the best features of this handbook is that it starts at the bottom and works its way through everything you need to know to get started managing a woodlot. *Managing Your Woodland* covers forestry basics (where trees grow, tree identification, how forests develop, safety in the woodland), woodland management phases (inventory through harvesting, marketing and reforestation), business planning and forest legislation. Chapters are organized so that "whats" and "whys" begin, and specific answers to the pivotal question "how do I actually do it" point readers in the right direction for action. Each section is followed by a list of recommended references to enable those who wish further or more in-depth reading to find it easily.



The Managing Your Woodland handbook can be downloaded at: bookstore.cfs.nrcan.gc.ca

The first version of *Managing Your Woodland* was published in 1988 by the Canadian Forest Service and the BC Ministry of Forests under the Forest Resource Development Agreement (FRDA). This guide was popular among both small-scale forestry practitioners and as a training manual for general forestry concepts. "The original handbook provided good basic information on a variety of technical forestry areas. It was useful to anyone who wanted to go into forestry, but our clients found it especially useful," says Randy Butcher (**rbutcher@pfc.cfs.nrcan.gc.ca**), Program Officer in the First Nations Forestry Program at the Pacific Forestry Centre.

The Small Woodlands Program of BC, which published a series of manuals between 1998 and 2002, picked up on *Managing Your Woodland* as a resource that could fit within its mandate. In co-operation with the Canadian Forest Service of Natural Resources Canada, the Small Woodlands Program contracted a group of experienced forestry professionals and land managers, ECON Consultants, to revise *Managing Your Woodland.*

The new edition of Managing Your Woodland includes:

- updated technical content;
- updated references (including websites, legislation and agency contacts);
- sections dealing with marketing, certification, agroforestry, non-timber values; and,
- updated terminology and general emphasis to better reflect sustainability.

In its utilitarian simplicity it still conveys the importance of inventories and management plans to successful woodlot management.

Foremost, *Managing Your Woodland* gives those who wish to start forest management the right methods and lets them know where to look for help. Ultimately, sustainable, long-term planning is up to those people. This handbook merely provides the tools.

At present, the revised handbook is only available online, and not in a printed version. To view or download the guide in .html or .pdf formats, visit either the Small Woodlands Program website at **www.swp.bc.ca** (click on "what's new") or the Canadian Forest Service online bookstore at **bookstore.cfs.nrcan.gc.ca** (search under title).

For more information contact Nello Cataldo, Manager, Collaborative Forestry Programs, Canadian Forest Service, (250) 363-6014, **ncataldo@pfc.cfs.nrcan.gc.ca**

Can Solid Deer Protectors Prevent Blister Rust From Attacking White Pines?

"In the lab, the concept of using deer protectors was very exciting because it was a unique method of preventing disease."

Plastic tubes placed over young white pine seedlings to discourage nibbling by wildlife may be protecting new growth from far more than ravenous deer and elk. A study by Dr. Richard Hunt (**rhunt@pfc.cfs.nrcan.gc.ca**) of the Canadian Forest Service Pacific Forestry Centre in Victoria indicates that the physical barriers also reduce the incidence of a disease called white pine blister rust caused by the fungus *Cronartium ribicola*.

Cronartium ribicola was introduced to eastern and western North America on infected white pine seedlings sometime prior to 1915. It has caused so much damage since then that, in many areas, white pine has been all but abandoned as a commercial tree species. Trees are killed or severely damaged as the fungus grows into and down the branches toward the trunk, eventually producing blisters that break through the bark and make it easier for other fungi and attacking insects to further invade the tree.

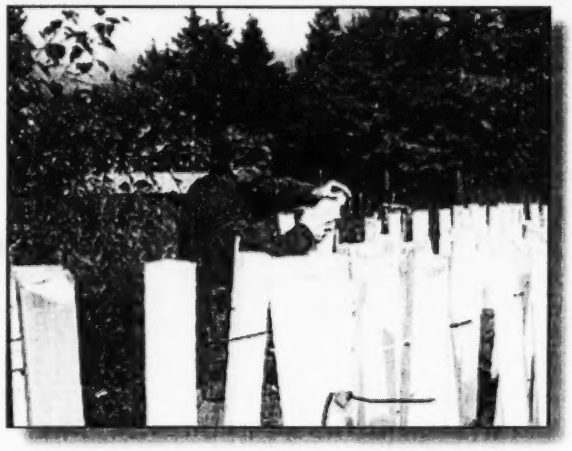
It appears that the deer protectors are either preventing spores from reaching the lower branches of the seedlings where most cankers start, or they are creating a microclimate inside the barriers that inhibits blister rust infection. Whatever the reason, the Canadian Forest Service study has found that the incidence of blister rust drops by as much as 90 percent in seedlings encircled by plastic.

Hunt's study began in 1996 with the planting of five hundred seedlings at four British Columbia sites: a coastal location called Gordon; an interior location called Beaton; and two other coastal sites, Pender and Trout. The tallest solid barriers available were selected for this study because 85% of blister rust cankers are found within 1.5 metres of the ground. The two types used were a tall, cylindrical deer protector, and a cone-shaped mini-greenhouse. Barriers were inspected at least annually, and those knocked over by animals or the elements were replaced when possible.

Seedlings at the Gordon site grew poorly, a result of rocky terrain and bears smashing many of the plastic cones. The Beaton site was "brushy," with competing forest vegetation sometimes growing right inside the cylinders. At the Pender and Trout sites some of the barriers blew over, and at the Pender site in particular, elk trampled many barriers. Cold temperatures and snow over the winter caused the heavy plastic of some barriers at all sites to split and collapse.

"When in the lab, the concept of using deer protectors was very exciting because it was a unique method of preventing disease; but in the real world it appeared cursed by mother nature – cold, wind, snow, rocks, weeds, elk and bears all proved very frustrating," recalls Hunt. Nonetheless, by 2000 when most of the seedlings were taller than 1.2 metres, there was a notable reduction in blister rust incidence. At the Beaton site only 3% of the seedlings with barriers were infected as opposed to 31% without barriers. At the two coastal sites of Pender and Trout, twice as many seedlings without protectors had cankers.

In conjunction with the BC Ministry of Forests, new research is testing more rigid types of barriers. Hunt notes that already fewer barriers are being damaged by snow. "The new barriers are more wind-firm because of better staking systems and in the new trials, sites favouring bears and elk have been avoided," he says.



Dr. Rich Hunt inspects solid deer protectors in nursery stock.

NOT WANTED: Exotic Species Coming Soon To A Forest Near You?

"The highest odds of transmission are actually on or in shipping crates which are transported around the country."

It's the wild west all over again in British Columbia, but instead of "Wanted" posters, we need some "Not Wanted" posters. Emerald ash borer, brown spruce longhorn beetle, nun moth - these are all pests we could do without. More than 19 species of bark and wood boring beetles have been intercepted in western Canada since 1992, and six are now established in British Columbia. In 1998 Canada ranked eighth in the world for imports, a position that can only increase our exposure to exotic species. Are Canadian forest ecosystems under siege?

When plants, animals and microbial organisms are moved by humans beyond their natural ranges they are considered non-indigenous, invasive or exotic species. Since the beginning of the 20th century species introductions have skyrocketed for three main reasons: increasing world trade, trade among diverse and distant partners, and the efficiency with which trade goods are transported. Whereas in 1900 it took three months to cross the Atlantic, goods can now arrive overnight. Imported goods and the materials they are shipped in, including the containers themselves, now have a better chance of carrying live hitchhikers, which in turn have a better chance of thriving in new territory without any natural competitors, predators or disease.

Peter Koot, research technician at the Pacific Forestry Centre, examines wood packing material in the Port of Vancouver for fungi and insects

"It's a very big issue, new introductions continue to occur all the time," says Dr. Eric Allen, (**eallen@pfc.cfs.nrcan.gc.ca**) Research Scientist in the Forest Health and Biodiversity Network at the Canadian Forest Service Pacific Forestry Centre.

One of the latest North American landed immigrants was discovered this July in southeast Michigan under the bark of dying ash trees. The Emerald Ash Borer is a native of Eastern Russia, Northern China, Japan, and Korea. Michigan Department of Agriculture officials do not know how it arrived in Michigan, nor do they know exactly how it might spread or very much about the insect's characteristics or possible behaviour in this new environment. They placed all ash trees and timber products in the infested area under quarantine, but the beetle already covers 600 square miles and, says Allen, "there have been very few successful eradication campaigns."

It is difficult for plant protection agencies to react to exotic species after they have been introduced and established themselves. This difficulty, coupled with the increasing rate of species introductions, is the impetus behind the Canadian Forest Service's Non-Indigenous Species Introductions research program. Dr. Allen, Dr. Leland Humble (**lhumble@pfc.cfs.nrcan.gc.ca**) and colleagues address three key research questions:

1. What pests threaten our forests and forest economies?
2. How are pests entering into and moving within Canada?
3. What can be done to reduce risk from non-indigenous pests?

Part of their efforts to reduce risk from non-indigenous pests is alerting the public to potential exotic pests through exotic pest advisories. "It's part of our ongoing education program. We want to draw up a Wanted list for all these exotic threats to get them into the eyes of people who will see them first," says Allen.

In a recent Exotic Forest Pest Advisory (available at **bookstore.pfc.cfs.nrcan.gc.ca**) Dr. Allen and Nick Humphreys warn that Canadian forests are at a high risk of exposure to the Eurasian nun moth. This defoliator's most probable entry point is coastal ports, where it could be accidentally introduced into North America on container ships from the Far East.

The nun moth is a major pest of Eurasian conifers. In its early larval stage the nun moth feeds only on new needles. In pines, immature larvae feed on male flowers, which can lead to total destruction of the following year's flowering buds. Defoliation of more than 70-80% causes mortality of spruce trees within a year. In Denmark the nun moth severely defoliates Sitka spruce, Douglas-fir, grand fir and lodgepole pine, all of which are native to British Columbia. If introduced and successfully established in Canada, the nun moth could cause unknown damage to forest resources.

"Foresters, woodlot owners, customs officials, we all must be aware of what the larvae, pupae and moths look like, what their

behaviour is like, and where to look for eggs if we are going to keep this pest from entering Canadian forests," says Humphreys. "The highest odds of transmission are actually on or in shipping crates which are transported around the country." According to Allen, "we need to figure out how to stop its particular pathway, and we need to introduce wood packing standards which will reduce the chances of invaders like the nun moth arriving in Canada in the first place."

Allen and Humble are pushing for the adoption of international regulatory controls on solid wood packing to reduce the risk of exotic species introduction through wood dunnage and shipping materials. Packaging materials have only recently come under scrutiny by quarantine officials as a possible route of distribution of exotic species. Canadian forests are at a particularly high risk as wood crates and wooden spools used to transport industrial equipment (e.g. spools storing single-use steel cable for logging) are perfect mobile homes for exotic wood borers.

A standard for regulating wood packaging material in international trade, known as ISPM 15 (International Standard for Phytosanitary Measures), was adopted by the Interim Commission on Phytosanitary Measures at its fourth session in March, 2002. A key provision of the standard is the use of a mark for the certification of approved measures, which Canada, Mexico and the United States have all committed to begin implementing by June, 2003.

In the interim, researchers at the Pacific Forestry Centre recommend several means of avoiding calamitous exotic invasions.

- Build an international database of forest-inhabiting organisms, identifying their hosts and life histories, including biological and environmental constraints. This database, used to develop accurate pest risk analyses, could help researchers predict what to look for and where to look for it.
- Examine quarantine interception records to narrow down the list of potential pests entering the country.
- Adopt a "heat treated only" policy between trading partners for wood dunnage.
- Modify lighting around ports during the female reproductive period.
- Develop monitoring and control strategies by analyzing the pathways by which non-indigenous species enter and move within the country.

Only by blocking the pathways and preventing exotic species from arriving in Canada can we prevent these "Not Wanteds" from invading.

NOT WANTED

by Natural Resources Canada
Canadian Forest Service

NUN MOTH

Alias: *Lymantria monacha*

Home: Eurasia

Description:

Eggs:	1 mm, spherical, opalescent brown
Larvae:	30-40 mm long at maturity, green-grey with brown-black mottling and white patches behind the head
Pupae:	18-25 mm long, shiny red-brown with light-coloured hair clumps
Adults:	Forewings: generally white with dark wavy lines and patches, occasional melanic forms Hind wings: grey with dark fringe Males: 42-46 mm wingspan, strongly pectinate antenna Females: 50-58 mm wingspan, long ovipositor, thread-like antenna

Last seen: loitering around lights in shipping ports and dockyards, laying eggs on ships, containers or dunnage
Occupation: defoliation
Preferred hosts: spruce, pine, fir, larch

The assistance of all foresters, woodlot owners, researchers and customs officials is requested in preventing the introduction of this exotic threat.

Notify any Canadian Forest Service office with information:

Pacific Forestry Centre	(250) 363-0600
Atlantic Forestry Centre	(506) 452-3500
Laurentian Forestry Centre	(418) 648-3335
Great Lakes Forestry Centre	(705) 759-5740
Northern Forestry Centre	(780) 435-7210

Afforestation Pilots Across Canada Test Carbon Sequestration Potential

"One option for expansion of afforestation in Canada is directly tied to incentives."

Forests provide a variety of environmental and social benefits in addition to fibre, such as wildlife habitat and improving water and air quality. In addition to economic, social and environmental roles, forests have the ability to remove (i.e. sequester) carbon from the atmosphere. Atmospheric carbon is a key contributor to climate change.

As part of ongoing efforts to reduce greenhouse gas emissions under the Kyoto Protocol, Natural Resources Canada has launched an initiative to investigate ways to maximize the potential of afforestation to sequester carbon. Afforestation refers to the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land.

"In Canada the majority of the land that is available for afforestation under this initiative is part of the non-industrial privately owned forest or agricultural landscape," says Elaine Teske (**eteske@pfc.cfs.nrcan.gc.ca**), Director of Programs, Planning and Operations at the Pacific Forestry Centre in Victoria, BC.

The government will be looking for novel mechanisms to finance and deliver pilot activities so that the cost, risks and benefits are shared between private and public sectors, and so that the carbon dimension is clearly visible in financing options. "One option for expansion of afforestation in Canada is directly tied to incentives," says Teske. "The potential dollar value of carbon, in terms of credits or reimbursements, is one such incentive," she says.

Carbon sequestration: a new dimension of tree planting

Assessing some of these financial incentives is a key part of a series of pilot projects which are currently being established across Canada in concert with non-profit stakeholder groups. The first British Columbia pilot will be in the Prince George region of the province, where there are close to 5800 landowners with land holdings of between 20 and 4000 hectares. "We hope to demonstrate how landowner and partner participation changes in response to different program partnership and delivery mechanisms," says Teske. "This offers the opportunity to introduce and test some new and creative models that attract players who have some interest in this new dimension of tree planting – climate change generally and carbon more specifically."

Once landowners are selected to participate in the pilot, the objectives include the following:

- exploring development of a carbon co-operative that collectively establishes and maintains newly established forests for carbon sequestration;
- examining the levels of participation of partners within various models, along with motivating factors for involvement;
- evaluating a number of low-energy input afforestation plantation establishment alternatives that will maximize net carbon gains;
- assessing a range of planting stock varieties for suitability under various climate change scenarios;
- developing an afforestation management plan that emphasizes the incremental benefits resulting from the efforts of the trials; and,
- sharing experiences and knowledge gained with other organizations in BC to maximize the impact and uptake of results from the pilot.

The pilot program will produce a suite of recommendations on the cost-effectiveness of the models developed and tested under various scenarios, data on the extent of partner engagement under each scenario, and an estimate of carbon returns.

As a first step the Canadian Forest Service, in concert with its partner the Federation of British Columbia Woodlot Associations, will convene a workshop this coming winter to which all potential partners and stakeholders will be invited. Provided resources are available, Natural Resources Canada expects to expand the pilot beyond the Prince George region to two other locations in British Columbia, and eventually across the country, in order to examine the full range of carbon sequestration potential.

Petite Predators Will Play Big Role In Biocontrol

"We should begin large scale field releases of Laricobuis nigrinus by 2005."

Tiny beetles from British Columbia are about to play a big role in saving over one million hectares of hemlock forest in the eastern United States, thanks to a Canadian Forest Service research scientist and two PhD students. Little *Laricobius nigrinus* eat and lay eggs on hemlock woolly adelgids. Bad news for the adelgids, they are killed in the process, but good news for the more than 25 per cent of all eastern and Carolina hemlocks in 15 northeastern states currently affected by a hemlock woolly adelgid infestation, and the Canadian hemlock forests at risk.

Hemlock woolly adelgid, native to Asia and western North America, was accidentally introduced to the east coast in the 1950s. When it feeds on the sap of hemlock, it appears to inject a toxic saliva which causes needles on infested branches to drop off. Eastern North American species of hemlocks are much more susceptible to the hemlock woolly adelgid than their Asian or western North American counterparts. Weakened trees often die within four years or are felled by wind, wood-boring insects or diseases.

The unique feeding and breeding habits of *Laricobius nigrinus* make it a perfect biological control agent. So does the fact that the petite predator, no bigger than an exclamation mark, can only complete its development on hemlock woolly adelgid. Biological control agents – they could be insects, nematodes, fungi or viruses – are natural enemies introduced to reduce excessive damage caused by exotic weeds or other insects.

Gabriella Zilahi-Balogh looks for eggs and larvae of Laricobius nigrinus *within the woolly ovisacs of hemlock wooly adelgid.*

Researchers discovered the connection between hemlock woolly adelgid and *Laricobius nigrinus* by accident. Dr. Lee Humble (lhumble@pfc.cfs.nrcan.gc.ca), Research Scientist at the Pacific Forestry Centre in Victoria, was surveying for the recovery of natural enemies released for biological control of another introduced adelgid when he first observed the association between *Laricobius nigrinus* and the hemlock woolly adelgid. "Larvae of an unknown beetle were consistently found in the early spring within the egg sacs of hemlock woolly adelgid during surveys of infested hemlocks in a seed orchard," he recalls. "These larvae turned out to be *Laricobius nigrinus*."

Canadian PhD student Gabriella Zilahi-Balogh, in collaboration with Humble, conducted two years of intensive field studies near Victoria, BC to determine the seasonal abundance of *Laricobius nigrinus* and synchrony between *L. nigrinus* and hemlock woolly adelgid. "The field studies complemented my subsequent lab studies, which focused on the life span of the beetle, female fecundity [number of eggs laid], its thermal development requirements and host specificity," says Zilahi-Balogh.

Zilahi-Balogh began her degree at Virginia Polytechnic Institute and State University in 1997, and is the first person to study *Laricobius nigrinus* since 1945. The biggest challenge, she says, is maintaining *Laricobius nigrinus* in the lab. The beetle undergoes a long summer diapause as an adult to wait out adverse breeding conditions. The hemlock woolly adelgid also undergoes a summer diapause, useful in terms of biocontrol potential. But high mortality in the insect's diapause phase makes it more difficult to efficiently rear the beetle for future mass release efforts. Ashley Lamb, a graduate student from British Columbia and former Canadian Forest Service technician at the Pacific Forestry Centre, is currently looking for ways to make it more feasible to raise *Laricobius nigrinus* in the lab.

As a result of Humble and Zilahi-Balogh's research, the United States Department of Agriculture Animal and Plant Health Inspection Service (APHIS) has removed *L. nigrinus* from quarantine status and approved the beetle's release against the hemlock woolly adelgid in the eastern United States. "We should begin large-scale field releases of *L. nigrinus* by 2005," predicts Zilahi-Balogh.

XII World Forestry Congress Coming to Québec City, Canada

"The World Forestry Congress is a chance for participants to turn dialogue into action."

Forests have always been critical to human existence. They sustain life and are also at the centre of a web of human demands – demographic growth and urbanization, agriculture, economic development, cultural values and environmental concerns. For forests to remain a source of life we need to plan our interdependence. The XII World Forestry Congress, taking place from September 21 to 28, 2003 in Québec City, Canada, will provide people with the opportunity to create innovative ways to balance human needs with forests' capacities.

The XII World Forestry Congress is being organized through a partnership between Natural Resources Canada, the Ministère des Ressources Naturelles du Québec, and the sponsoring agency, the United Nations Food and Agriculture Organization (FAO). As a national facilitator and through Natural Resources Canada, the Canadian Forest Service brings to the table scientific excellence and its ability to forge strategic alliances and partnerships with a wide spectrum of client groups and partners. These include provincial and federal governments, forest industries, Aboriginal communities, academia, labour groups, private woodlot owners, and environmental, conservation and special interest groups.

Through three central themes the World Forestry Congress will draw out a wide spectrum of forest-related issues: forests for people, forests for the planet, and people and forests in harmony. Voluntary paper presentations, workshops and a continuous virtual forum are all on the agenda, as well as over 7000 square metres of space designated in Québec City's Convention Centre for exhibitions offering practical solutions and technical advances in sustainable development. Conference discussions will be grounded in participants' experience. Their ideas will help research organizations identify useful directions for future research, and promote technical standards for international forestry terminology. The three themes are designed as launching points – participants will take them and make them relevant to their own audiences, bringing diverse perspectives to the discussion table.

"The World Forestry Congress is a chance for participants to turn dialogue into action," says Jacques Babin, (**Jacques.babin@wfc2003.org**), member of the Congress Secretariat. "Discuss your achievements, stay on top of cutting-edge technologies, establish alliances, help develop a vision for the future of forests – there are many excellent reasons to participate in the World Forestry Congress," he says. And with a wide selection of keynote speakers and participants from across the spectrum of UN member countries, diversity is the key.

Past World Forestry Congresses are recognized for the high standard of papers and deliberations they generate, as well as the broad consensus driving policy and technical advice to governments and international organizations. As the main global forum on forests and forestry, all geographic regions have a shared interest in its preparations. With no formal constituencies or country delegations, implementation of its recommendations is incumbent upon those to which they are addressed – governments, international organizations, scientific bodies, and forest owners.

The World Forestry Congress presents an excellent opportunity to build international networks. As well, through participating in this forum, Canadian researchers and scientists will demonstrate a willingness to have Canadian accomplishments and activities evaluated, and take the opportunity to learn from other experiences. The event itself will provide a venue to demonstrate Canada's excellence in forest management – in research, forest science and technology, and in policy governing sustainable management of forests – and commitment to people and forests in harmony.

For more information on financial assistance, study tours, how to submit a voluntary paper, the exhibition or registration and accommodation, contact:

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Recent Publications

WRS-Canada: Integration of the Landsat Worldwide Referencing System with ecological, geographical, and demographic data. 2002. Wulder, M.A.; Seemann, D.; Low, B. Technology Transfer Note 27. 6 p.

WRS-Canada : Intégration du système de référence mondial (Worldwide Referencing System) de Landsat avec des données écologiques, geographiques et démographiques. 2002. Wulder, M.A.; Seemann, D.; Low, B. Note de Transfert Technologique 27. 6 p.

The Bridge – October 2002. Newsletter of the British Columbia First Nations Forestry Program. 2002. Stone, J., editor. Copublished by Indian and Northern Affairs Canada. 12 p.

Stand structure and species composition in chronosequences of forests on southern Vancouver Island. 2002. Blackwell, B. A.; Hedberg, H. A.; Trofymow, J. A. Information Report BC-X-395. 72 p.

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Comings and Goings

Comings and Goings

Welcome to Dr. Mike Apps, senior research scientist at the Pacific Forestry Centre and adjunct professor in forestry faculties at both the University of Alberta and Lakehead University. Dr. Apps has earned international recognition for his research on the role of northern forest ecosystems in global change. He will co-lead the development of a national forest Carbon Accounting Framework to meet Canada's international commitments under the United Nations Framework Convention on Climate Change.

Dr. Apps came to the Pacific Forestry Centre from the Northern Forestry Centre in Edmonton, where he led the development of the national scale Carbon Budget Model for the Canadian forest sector.

Coming Events

Impacts and Adaptation Workshop

February 17-19, 2003 • Prince George, BC

Organized by the Canadian Climate Impacts and Adaptation Research Network (C-CIARN) Forest Sector and the University of Northern British Columbia, this workshop will focus on impacts and adaptations in the northern and western forests of Canada. The goal will be to provide up-to-date information on climate change and its expected effects on the forest, forest management, and the social and economic fabric of forest-based communities. Participants will help chart a course for future research priorities on climate change.

For more information on the workshop or to register, visit the conference website at **www.res.unbc.ca/climatechange**, or contact:

Greg McKinnon, Forest Sector Coordinator, Canadian Climate Impacts and Adaptation Research Network (C-CIARN)

Canadian Forest Service, Northern Forestry Centre, Edmonton, AB
Tel: (780) 430-3840 • Fax: (780) 435-7359 • Email: gmckinno@nrcan.gc.ca

Coming Events

International Union of Forest Research Organizations conference: "Information Interoperability and Organization for National and Global Forest Information Systems"

September 17-19, 2003
Québec City, Québec, Canada

International Union of Forest Research Organizations (IUFRO) Divisions 4.11.03 (Information management and information technologies) and 6.03.00 (Information services and knowledge organization) invite participants to this satellite event of the XII World Forestry Congress. The conference goal is to bring together international scientists, practitioners, administrators, and information professionals to discuss recent advances in the use and organization of information within national and global forest information systems.

For more information see the conference website, **www.pfc.cfs.nrcan.gc.ca/interop/index_e.html**, or contact the Organizing Chair:

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